

GMD 5 Model Technical Advisory Committee Minutes

October 23, 2008

Attendees: USFWS: Rachel Laubhan; KWO: Susan Stover; Balleau Groundwater, Inc.: Peter Balleau and Steve Silver; SSPA: Steve Larson; GMD 5: Sharon Falk and Orrin Feril; KDA-DWR: David Barfield, Bruce Falk, Jeff Lanterman, Tina Alder, Andrew Lyon, Darci Paull, and Lisa Allen.

The presentation used during this meeting can be found at www.balleau.com, log in at the top-right button of the welcome page with the user name “GMD5”, and the password “ZENITH” all in caps.

The meeting began with introductions and remarks by Tina about the opportunity we have to work collaboratively to build a model that will help us understand the hydrologic conditions in the district and to have a tool to assess the effect of future management scenarios.

Peter then began going through the presentation that Balleau Groundwater, Inc. had prepared for the meeting. The model area and grid were reviewed as the model will have ½ mile by ½ mile grid cells, with 120 rows and 216 columns, for a total of 26,945 active model cells. Peter then addressed components of the model that will advance the understanding of the district’s hydrologic system and some of the unique work elements that will be needed to build in these capabilities. Steve L. questioned whether adding some of these complexities right off the bat was the right thing to do. He suggested that the model be constructed in a more basic form to begin with, and complexities could be added later as needed as it makes it more difficult to calibrate. We should start simple and work our way in as we need to learn how the model performs, otherwise there will be no money left to see how it performs historically. Peter agreed with this line of thinking, but also emphasized that many of these complexities are needed to address specific questions that have been asked by the GMD 5 Board.

Steve L. asked about the need for catchment delineation and about the chloride-ion and soil-moisture recharge and other options that were available to address these problems. He also stated that stream flows, reported pumping and water levels are the things we know and that we have to hang our hat on this data.

Peter described some of the work they have done using LANDSAT to look at the amount and distribution of evapotranspiration coming from the land surface. Peter believes that the presence of a shallow water table contributes to the crop irrigation requirement calculations and will be an important aspect of the model. Thus applying the farm process module on a limited number of cells will help to account for these areas. There was considerable discussion about the amount of area that has these shallow water tables, and it was agreed that this would need to be investigated further.

Stream gage stations within and near the model domain were shown, as well as locations where DWR and GMD#5 stream gage on a monthly or quarterly basis. There was a discussion on how a traditional Modflow model only calculates base flow, but that this model would have the capability to calculate total flow by including run off. Steve L. mentioned that runoff is typically not included in the modeling process and asked how they planned to extrapolate runoff back in time if there is no gage data available. Peter explained that they were going to look at changes in land practices, the stream and farming back to 1860. Steve L. questioned going back so far and explained that there would be a lot of effort expended for marginal value. **Peter sees value for explaining recharge and baseflow trends.** We really need to focus on the period in which we have observed data.

The multi-layers of the model were discussed. Steve L. suggested that a one layer model be built first, and then layers could be added later if needed. It was stated that scale could be an issue with the shale layer. It was **discussed** to look at the amount of Dakota pumping to determine how important having a differentiated layer would be.

There was considerable discussion on the yearly precipitation, calculating recharge and estimating historical pumpage. There were different ideas on how to get to the numbers and the future runs, but all want the same result. Peter pointed out the cooling ET was not captured in the Middle Arkansas model and wants to include in this modeling process. Steve L. suggested separating the irrigated and groundwater ET areas as application of irrigation water on the surface is going to account for the irrigated land.

Peter then talked about the pump tests that have been completed in the district and how this information would be incorporated into the model. A range of values for a few different properties was presented, and it was discussed how calibration of the model will determine the final values of these properties.

Salt intrusion and discharge were discussed and why it needed to be included in the model. Recharge was also discussed, and Peter stated he wanted to start off with a method similar to the technique used in the Mid Ark Model. Streams and other surface water bodies will be accounted for in the model due to their influence on recharge. It was stated that while we will incorporate these surface water features, the model will not simulate operations of diversion works. Peter then gave some examples of output graphics that would be used in the future.

The Multi-Node Well package was reviewed and it was stated that the primary reason to use this package was the ability to simulate pumping water levels. This will be used for future scenarios and not for calibration of the model. This was illustrated with a graphic that demonstrated the effect of reduced well yields as head decreases.

Peter discussed the methods of calibration that he intends to use and stated that he was looking forward to working with SSPA during this step to properly calibrate the model.

Some of the capabilities that GMD#5 and Balleau Groundwater, Inc. want the model to have were reviewed. Scenarios from the prior Rattlesnake Creek and Mid Ark models were shown

and Peter talked about reworking some of these scenarios and adding new scenarios to come up with a list of core scenarios. There was some discussion stating that we should get the model built first, and then decide what scenarios we need to run. **Peter thinks the scenarios should be anticipated to ensure such capabilities are built into the model.** One point of discussion was the years that the model will be run for. Balleau Groundwater, Inc. believes that extending the model back to 1860 will allow for the model to take into account the effect of changing land use as well as pumping effects over time, while others stated their desire to only go back as far as we have data to construct initial conditions, which would be in the 1940's (pre-development). Peter pointed out that it appeared the GMD#5 Board was interested in **early land-use effects but might do a second** steady state condition run re-starting in 1940-1950s. It was suggested that the calibration period be extended to 2007 in an effort to capture all data available. Finally, Peter talked about the schedule for model development that Balleau Groundwater, Inc. put together. It was stated that the TAC would try to meet every six to eight weeks, and that DWR will circulate a date that works for everyone for the next meeting in early December.

In summary, Steve L. stated to keep it simple, compile the pumping data, and get the transient model running very soon.

Action Items:

1. DWR will research and gather information on the Dakota and Kiowa geologic formations in the district and transmit to Balleau Groundwater, Inc.
2. DWR will communicate with Balleau Groundwater, Inc. about data needs. DWR will pull information from WIMAS and transmit this data to Balleau Groundwater, Inc.
3. DWR will provide Middle Arkansas well transect and streamflow data to Balleau Groundwater Inc.
4. **BGW will exchange model files with Larson and DWR as reviewable files are developed.**